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RUNNING HEAD: Authority in knowledge-building

The Teacher-leader's dilemma: Authority in knowledge-building

David H. Eddy Spicer ^a

^a University of Bath, Department of Education, Bath BA2 7AY, United Kingdom;
D.EddySpicer@bath.ac.uk

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Address for correspondence:

Dr David H. Eddy Spicer
Department of Education
University of Bath
Bath BA2 7AY
United Kingdom

e: D.EddySpicer@bath.ac.uk

p: +44(0)1225 384849

f: +44(0)1225 386113

(N.B. This version contains original references, not pseudonymized.)

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Abstract

This case study of a teaching team investigates the ways in which authority operates in the development of professional knowledge. The study analyzes the interaction of a teacher-leader and a science teacher team across two settings of professional development organized to promote curricular reform in their U.S. secondary school. The analysis reveals how acknowledged expertise, or epistemic authority, functions to open up or close down possibilities for engagement around subject matter, teaching, and student learning. The study advances an expanded view of epistemic authority in knowledge building as the negotiation of difference through implicit control.

(96 words)

Keywords: educational change, knowledge base for teaching, teacher leadership, participative decision making, semiotics, sociocultural patterns

1 Introduction

This study explores the dynamics of control in the development of professional knowledge through collaboration. The study traces the ways in which authority is realized through specific patterns of positioning in interaction. The analysis pays close attention to the role of senior teachers in a team of teachers, examining in particular the “instructional coach”, a senior teacher appointed to lead the team in two very different settings of professional interaction. One of these settings was a teacher-run curriculum group that the teachers themselves organized and the other was a school-organized workshop that the school administration required teachers to convene as part of a reform initiative.

Current literature about collective knowledge building through professional collaboration tends to present control as external to the dynamics of the group in one of two ways. The most prevalent treatment of control is that of professional empowerment, with the collective resisting external pressure and setting its own agenda. This view posits what Bernstein (2000) calls the assumption of “in-built procedural democracy” (p. 43). The idea of “in-built” points to the premise that non-hierarchical relations are a precondition for knowledge-building as a collective enterprise.

A second way of viewing control and the collective also views the levers of control as held beyond the group. Viewing collaboration within the wider frame of social practice, some have called into question the very aims of participation, ranging from those analysing micro-politics within the school (Achinstein, 2002) to those presenting broad critiques of participation as institutional practice (Anderson, 1998). Towards the latter, Anderson (1998) surveys his own and others’ research into participatory practices in education and invokes the notion of “concertive control” to describe the implicit forces at work. Anderson concludes, “Increasing professional or democratic control too often appears to have the effect of increasing self-regulation rather than empowerment” (p. 578). In the first view, that of empowerment, the collective insulates those taking part from the corrosive and deprofessionalizing effects of control from the outside. In the second view, external control insinuates itself into collective action through self-regulation.

Other research suggests that the opposite poles of self-regulation and empowerment may be viewed as contradictory tensions that are under constant negotiation—implicitly and explicitly to varying degrees—in collaborative work. Thus, the mechanisms of concertive control in relation to collaboration are not necessarily fixed nor hegemonic but operate dialectically. Wood (2007) describes the evolution of teacher collaboration within a district reform initiative in the US as forged from the contradictory tensions between hierarchical forms of bureaucratic control, on the one hand, and on the other, local emphases on agency, autonomy and engagement. Similarly, Bottery (2007) highlights the ways in which school leaders and their staff in England recontextualize rather than strictly reproduce national policy initiatives depending on situational characteristics within and beyond the school.

These studies point towards an understanding of control as integral to interaction. The stance adopted in this study is to accept power and control as attributes of all interaction while probing the qualities of control involved in efforts to build knowledge and sustain innovative practice. Professional empowerment and tacit coercion are possible and non-exclusive outcomes, shaped by and shaping institutional practice. These outcomes may be viewed as the effects of specific modalities of control in institutional practice. Modalities of control, in this sense, refer to the intertwined aspects of social relations among teachers and and relations among ideas.

The intertwined negotiation of social relations *in* practice and building knowledge *about* practice are especially evident in the position of “teacher-leader”. Teacher-leaders hold highly-charged places in the promotion of knowledge-building practices around fundamental aspects of school reform. Their role within the organization may be more or less formalized; yet, indirect control is the primary means through which they are expected to work. York-Barr and Duke’s (2004) review of the literature on teacher leadership emphasizes the centrality of ‘influence’ as the means through which teacher-leaders exercise power, highlighting how crucial both social and ideational relations are to their orbit of action. Moreover the review makes clear that teacher-leaders are typically expected to accomplish multiple ends, that of moving forward individual teachers, advancing his or her team, and carrying out the wider agenda of reform to which the organization ascribes (pp. 287-288).

Within schools, teachers who take on semi-formal roles often find themselves in ambiguous positions in relation to their peers. Teacher leaders must constantly negotiate conflicting agendas. This introduces a tension both for teacher-leaders and the teachers with whom they work (Gunn & King, 2003). While promoting egalitarian ideals of collegial interaction, teacher-leaders often bear implicit responsibilities, if not the line authority, to carry forward school policies that make their role, status, and allegiances unique. Such negotiation becomes acute with the introduction of new policies that aim to instill new practices. Teacher-leaders occupy what Long (2001) characterizes as an “intercalary position” inserted between different domains of practice—disciplinary teaching and school management—as well as different organizational levels that require them to respond to their own group’s concerns as well as the expectations of others (p. 70). Thus the interweaving of social relations and relations among ideas becomes especially important in organizational positions that have such a degree of latitude.

2 Background

The study examines one part of a broader reform effort within “Lincoln-Gateway High School”, the sole public secondary school in the “Gateway School District”, an urban district in the upper Midwest of the United States.¹ The centerpiece of the reform was the implementation of a shared pedagogical framework across all departments in the school. The school of 1,500 students had been through several years of a contentious effort to reorganize, culminating in 2003 with a highly-critical report of the school’s administration and its approach to curriculum by a regional accrediting body that periodically inspected the school. The criticism centered around large disparities in student achievement across the school. The report intensified scrutiny by state education officials, who had already targeted the school for the low performance of minority students on state mandated standardized tests. With accreditation suspended following the report, the state department of education threatened to assume direct management of the school if the local school district and the school itself could not rapidly address concerns raised.

The school administration responded by shifting the school to a dramatically different “block schedule” timetable, effectively doubling the length of most class sessions, allowing students to complete what had been a year-long unit in one term. The expanded time for classes also meant that students took half the number of subjects each term, reducing their course load from seven subjects to four within a term while increasing the overall number of subjects students could take in a year from seven to eight (i.e., four subjects in each of two terms). The shift to longer class periods aimed to promote “deeper learning and greater achievement” for greater numbers of students.² To help with the transition to block scheduling, the local district allocated a large sum for teacher professional development in the year preceding the timetable reforms. Administrators made use of a provision in the

collective bargaining agreement with the teachers union that allowed the district to mandate after-school professional development with additional pay in exceptional circumstances.

The planning for the shift to the new timetable thus became a central concern of school-wide professional development in the year preceding the shift (2004-2005). The school-organized professional development effort sought to introduce a general pedagogical framework by using on-site coaching and collaboration. The school administration selected an approach already familiar to some of the senior teachers at the school. Descriptions of the selected framework, Teaching for Understanding, noted that it was widely used to plan, conduct, and analyze teaching aimed at developing learners' capacities to apply understanding flexibly in varied situations (Blythe, 1998; Wiske, 1998; Wiske & Perkins, 2005).

The school leadership expected teams of teachers organized by subject to use the approach as a tool for learning from, rendering problematic, and reinventing their own and others' teaching practices. School leaders described Teaching for Understanding as offering the teaching faculty, "a common language across grade levels and subjects for thinking through, discussing, and articulating curriculum choices and documents."³ The teacher leaders in each subject area were charged with bringing the reform to fruition through planning and carrying forward the professional development associated with the timetable reform. For many subject areas, the role of the teacher-leader in carrying forward reform was new. However, the science department at the school had a longstanding tradition of formal teacher-leader roles funded through grants to the local district, resources that gave science teacher-leaders a measure of autonomy from the school administration.⁴

This research follows the team of physics teachers and the teacher-leader with whom they worked across two settings of professional development, one of which was organized by the school administration as part of the reform initiative and the other of which had been organized by the teachers themselves several years before the most recent reforms were put into place. The school-organized professional development workshop that focused on Teaching for Understanding was run by Helen, the physics teacher-leader, who met biweekly with the school's nine physics teachers. Helen determined topics to be addressed in each workshop session with teacher-leaders from other subject areas and a coach who had many years of experience using the framework. The specific contents of each workshop were worked out by each teacher-leader in collaboration with the teachers with whom she worked to account for the differing needs of each group. The overall aim of the workshop sessions was to develop specific plans, including a detailed syllabus and exemplary lessons, in preparation for teaching in the new timetable while aiming for "deeper learning and greater achievement".

More than any other teaching team in the school, the group of physics teachers were well-versed in collaborating to develop new curriculum. All physics teachers participated, with varying degrees of commitment, in a biweekly meeting known as the "physics first group", which had been running consistently for five years, well before the current wave of reforms. The curriculum that gave the name to the group, "Physics First!," reversed the traditional sequence of U.S. secondary school science (i.e., biology, chemistry, physics) to teach physics in the first year to entering freshman.

Among the main tenets of Physics First was a push for teachers themselves to collaboratively develop their own curriculum. The eight physics teachers, including the teacher-leader, were widely recognized within the school and in the district for their collaboration. The teachers were one of only two school-wide academic programs identified as exemplary in the highly-critical inspection report. The group of physics teachers had worked out effective ways to continue their collaborative work during periods of upheaval, supporting one another around areas of immediate concern and, more broadly, collaborating

on common goals set by a curriculum to which all, the most senior and most junior colleagues, contributed.

An observational study of interactions in this group (Eddy Spicer, 2006) identified three participants in particular who held expertise in a number of areas crucial to the productive work of the group: Helen, the teacher-leader; Louise, an expert in teaching science through inquiry; and Roger, the most senior teacher on the team. (Table 1 lists the teachers who took part in the study and participated in the two groups.) These physics teachers had been at the school the longest and had all been involved in organizing and sustaining the teacher-led Physics First Group and the development of the Physics First curriculum from its earliest stages.

[TABLE 1 ABOUT HERE]

It was Helen, the teacher-leader who maintained the most multifaceted roles in the group. Observation of her interactions with the group show her serving as arbiter of key information in three critical areas for the group: the Physics First curriculum, the tenets of Teaching for Understanding, and relationships with “powers-that-be” external to the group. The latter involved school-level issues (especially the school schedule and professional development requirements), the district science department, and district and state curriculum standards for physics.

3 Conceptual Framework

I link two frameworks to make sense of the semi-formal nature of the role of teacher-leader and how the teacher-leader operates to develop knowledge-building practices in ways that interweave the social and ideational relationships in the group. The first is a characterization of dimensions of authority that relate to the basis for influence within the group and legitimacy within the school. The second is a theoretical framework adopted from the work of Bernstein that offers the means of connecting authority with positioning in interaction.

3.1 Dimensions of Authority

The areas of Helen’s influence, as well as the areas in which others held sway, can be broadly characterized with reference to three distinct dimensions of authority that are crucial to the dynamics of interaction within the group. Following McLaughlin (2007), these types of authority can be characterized as managerial, operative, and epistemic (pp. 72-73). The first two, managerial authority and operative authority, have to do with obedience to one *in* authority. The third, epistemic authority, corresponds with deference to one considered *an* authority. Both managerial and operative forms of authority depend on formal and informal roles, either formally constituted through the institution or, with operative authority, provisionally defined by the collective. Epistemic authority is commonly defined as an authority in a field of knowledge in contrast to positional authority within an institution or within a collective. To paraphrase De George (1985), epistemic authority is that one person holds a proposition “to be true or more probably true” after someone or something taken as an authority enunciates that proposition (p. 33). De George elaborates that a ‘*de facto*’ epistemic authority is one considered to be an authority by another or by others with respect to some field or area of knowledge” (ibid, p. 27). Wilson (1983) identifies epistemic authority more simply as that which arises from collective perceptions of those who “know what they are talking about” (p.13).

The observational study (Eddy Spicer, 2006) made clear that different group members held sway in different domains of authority characterized by managerial, operative and

epistemic. This was particular the case for Helen, whose formal role as “instructional coach” hinged on the exercise of all three. And yet, the articulation of these domains does not help reveal how authority operates in the fluid dynamics of collective knowledge-building. It is towards an understanding of the dynamics of authority in collective knowledge-building that I elaborate an analytic construct for the empirical investigation of authority relations in interaction.

3.2 Explicit and Implicit Control

An understanding of the dynamics of authority in collective knowledge-building requires a way of explaining how teachers position themselves and one another in professional exchanges. Bernstein’s (2000) concept of framing through implicit and explicit control offers such a perspective. Framing provides conceptual tools for understanding how power enters into social relations through positioning, and in so doing molds not only how participants make meaning within interaction but also and, most important, which meanings are available to be made.

Bernstein’s research at the broadest sweep considers the communicative and semiotic features of power and control in how schools are organised, what is taught, and how teaching and learning happens (Erickson, 2009, p. 137). Fundamental to Bernstein’s project is that experience in social settings forms, deforms and transforms what constitutes knowledge and its development (Hasan & Webster, 2009, p. 120). The qualities and degree of control, as expressed by framing, are conditioned by relations of power that exist beyond any particular interaction. Framing characterizes “*how* meanings are to be put together, the forms by which they are to be made public, and the nature of the social relationships that go with it” or, put simply, “*who* controls *what*” (Bernstein, 2000, p. 12, emphasis in original). Positioning, in this view, is a manifestation of both relations among ideas as well as relations among people. The ways in which people position themselves and one another through framing in any particular interaction thus shape the possibilities for the kinds of meanings that may be conveyed through that interaction.

Framing yields patterns of positioning in interaction that establish, in Bernstein’s words, “specific relations to other subjects and the creating of specific relations within subjects” (1990, p. 13). In this way, framing relates authority as an attribute of the division of labor to positioning as an aspect of interaction within specific settings, and in so doing, provides the means of explaining how dynamics at the institutional and collective levels relate to the microprocesses of interaction (Daniels, 2007, p. 98).

The components of framing include both social relations and relations among ideas as expressed through control over the selection of topics, the order with which topics are addressed, the criteria that determines legitimate interaction, the pacing of interaction, and the ways in which hierarchical relationships among participants are realized through interaction . (Bernstein, 2000, p. 12). Control over these qualities may be more or less explicit. Explicit control operates through recognized vertical relations of power, in which both “who” and “what” are clearly demarcated, as with parent and child, leader and follower or expert and novice. Explicit control operates through strong framing. Strong framing of interaction proceeds through specific relations, with the non-dominant participant, deferring to the verbal actions of the dominant participant. This characterization of positioning in interaction aligns with the definitions of authority offered above, both in terms of being *in* authority in terms of managerial and operative dimensions, as well as *an* authority for the epistemic dimension. For example, *an* authority would be expected to establish criteria for expertise as well as uphold the social base that distinguishes expert and novice positions in interaction.

The premise of this study is that such explicit control through strong framing is antithetical to the sustained interaction and apparently equal exchange of ideas that define

collective knowledge building (Bernstein, 2000, p. 95). Implicit control must then proceed through a relatively shared negotiation of “who” and “what”. The apparent absence of authority, or masking of authority, is the distinguishing feature of weakly-framed interaction, in which no single participant or group of participants maintains explicit control.

The negotiation entailed by weak framing does not imply that control is absent; control is implicit. With weak framing of interaction, the non-dominant participant has more *apparent* control. Hasan (2001) emphasizes that weak framing is not the same as the absence of control; it indicates “a qualitatively different kind of power and a different mode of control” (p. 65).

Collective knowledge building is taken as operating through a network of relations exhibiting a wide variety of strategies of control, manifested in interaction through a range of patterns of positioning available to participants. The premise of the study is that such patterns of positioning allow for movement of relations among people, or interpersonal relations, as well as relations among ideas, or ideational relations. The interest of this study is to explore the dynamics of the mutual development of interpersonal and ideational relations across the different domains of managerial, operative and epistemic authority that comprise professional interactions that aim towards collective knowledge building.

4 Methods and Sources of Data

The conceptual framework elaborated above requires an analytic approach that allows for the identification of patterns of positioning and the relationship of these patterns to dimensions of framing. Such an analysis hinges on uncovering the “achievement of interactivity” moment-by-moment, as interaction unfolds (Eggins & Slade, 1997) with attention to both interpersonal and ideational relations.

The social-semiotic theories of language of Halliday, Hasan and others offer an analytic framework, which includes terms and approaches for exploring the social activity of meaning making with and through language in particular situations (Eggins, 2004, p. 87; Lemke, 1995, p. 6). My analysis of team discourse derives from speech function labels elaborated in Eggins & Slade (1997, see in particular pp. 169-226) and Eggins (2004, pp. 141-187), which build on Martin’s (1992) considerations of meaning making through dialogue (pp. 31-91) and Eggins’ (1990) studies of casual conversation. Underlying all is Halliday’s conceptual characterization of the nature of dialogue (Halliday, 1994, pp. 68-69; Halliday & Matthiessen, 2004, pp. 106-111), a characterization articulated in close connection with Bernstein’s research (Hasan & Webster, 2005)

Eggins’ and Slade’s description of casual conversation in functional terms offers ways of elaborating just what happens to the proposition that initiates interaction in a given exchange, which is of vital importance to discerning the knowledge building processes of talk in collaboration. Speech function labels also offer ways of exploring the interpersonal function of language by looking closely at particular patterns of positioning adopted in interaction.

The codes developed for my study focus on how *information* is exchanged and *who* takes on what position with regard to that exchange of interaction. These codes are a way of systematically describing what happens to the development of ideas as the exchange unfolds both in terms of relations among ideas as well as relations among people.

I am particularly interested in two dimensions that correspond to my earlier characterization of knowledge building discourse as weakly-framed interaction conditioned by implicit control. These dimensions can be distinguished through the coding structure. The first is around patterns of positioning that either pull the conversation towards closure, an indication of strong framing, or open up interaction, steering it away from tidy conclusions,

indicative of weak framing. The second dimension is around whether interaction supports or contradicts the proposition under discussion.

4.1 Data Sources and Sampling

The primary data for this study are transcripts and fieldnotes from audio recordings and observations of team interaction in the settings described earlier, a teacher-organized group and a school-organized workshop. Eight physics teachers and the physics teacher-leader, with teaching experiences ranging from 3 to 36 years, took part in these meetings from December 2004 to June 2005.

I selected two sequences for discourse analysis for each of the two settings, one each drawn from an early and a late event. Before I identified these key sequences, I reviewed my out-of-field event summaries for every event in both settings. My first sampling criterion was that the event be considered successful in terms of generating a “successful” work product from interactions that had direct implications for teachers’ ongoing work. I defined success as (a) generative use in other settings beyond the event in which it was created and (b) comments in interviews or through observations by teachers about the efficacy of the work product in accomplishing the goals for which it was intended. I then analyzed these events for sequences of interaction that were most critical to the production of the work product that came out of the group’s interaction.

These sequences of interaction, which I call sequences of pedagogical understanding, are excerpts of joint activity that are concerned with elaborating, through justifications and explanations, topics related to teaching, subject matter, and student learning. Such portions involve retrospective and prospective discussions of classroom processes, as well as discussion of interactions with students.⁵ I identified these sequences by looking for clearly demarcated passages of interaction through which a set of topics related to the creation of the final product was “introduced, negotiated, and brought to completion” (Wells, 1999, p. 236). I then carried out detailed transcriptions of these passages, which ranged in length from twenty to fifty minutes, using the CHAT transcription conventions (MacWhinney, 2000).

Once I completed coding, co-coding to check validity and reliability of my approach, and recoding,⁶ I first looked at the categories of codes within a given sequence as a whole (synoptically). I then looked at how patterns of codes unfurled over time (dynamically) to identify supportive and challenging patterns associated with sustaining or closing down interaction. Finally, I explored differences and similarities in the distributions of speech function and patterns of positioning across settings.

5 Findings

My findings relate patterns of positioning in interaction to explicit and implicit control. I have organized patterns into two broad categories, one associated with strong framing that moves interaction towards closure and the other category of patterns associated with weak framing that opens up possibilities for continued interaction. Below I identify these patterns, elaborating in particular on those that serve to extend interaction in an effort to understand how implicit control operates in knowledge building discourse.

5.1 Explicit Control: Moving Towards Closure

Across the six sequences, those acknowledged as experts were more likely than others to use certain speech functions which proscribed to varying degrees corresponding patterns of response. These patterns of positioning reflect everyday characterizations of those who were regarded as ‘an authority’—declaring, resolving, and contradicting. When those acknowledged as experts exercised their authority in these ways, it limited the ensuing exchange, leading to closure.

As mentioned above, the patterns of positioning that delimit interaction are what we would expect of an interaction that involves strong framing. The patterns associated with declaring, for example, apply to a sequence in which one person has a high proportion of declarative opening moves that set the propositional content of interaction. Another speech role that indicates acknowledged expertise is ‘resolving’—attributed to someone directly called upon by others to provide information in her areas of expertise. The moves associated with the resolving patterns of positioning are ones that provide clarification or agree in a way that extends information already presented.

One who holds status as an expert can also simply close off further interaction by contradicting something a preceding speaker has put forward. Moves related to patterns around contradicting put the speaker in an adversarial position in regards to others. While the ideas of someone taking on the role of resolving are actively sought out by others, contradicting—literally one who speaks against—is a more assertive way of positioning oneself in relation to others.

Declaring, resolving, and contradicting take control of the development of the exchange in ways that narrow the possibilities for drawing in information from others in the group. I have presented these patterns of positioning along a continuum that requires increasing assertiveness on the part of the speaker, from the mildly assertive position of putting forward a topic for continued discussion to the strident role of countering what someone else has said. As Excerpt 1 shows, these ways of positioning are not attributable to an individual; for one participant to control interaction successfully along the lines described here requires that others are positioned in complementary ways, in this case deferring to the speaker’s perceived knowledge of a topic, as Louise does in her final turn in the example above.

5.2 Implicit control: sustaining interaction

The patterns of positioning of declaring, resolving and contradicting exemplify what we expect of *an* authority in interaction. These patterns are at least somewhat assertive and operate in a way that narrowly proscribes the possibilities for continued interaction while explicitly upholding the dominant speaker’s authority. I now turn to one pattern of challenge and three of support which, in effect, hand over control of interaction to others. That is, rather than seeking to close down continued interaction, these patterns of positioning function to promote continued interaction, extending the range of moves available to those other than the acknowledged authority and, in so doing, drawing out other speakers’ involvement in elaborating a topic.

5.2.1 Challenging

The pattern of positioning I have labeled challenging differs from the assertive role presented earlier, contradicting, in that the speech moves associated with challenging do not shut down further avenues of interaction but instead open up the floor to debate. As described below, such challenge might come in the form of questions or statements that present a contrasting point of view in a way that invites rebuttal. This is the pattern most commonly considered an essential part of “critical collegiality” (Lord, 1994) and yet, as I explain later, the relations of authority under which it appears are very constrained. Both the resolving and contradicting speech roles described above depend on other interactants’ deferral to the speaker whose statements they take as uncontested. Challenging happens when others in the group do not defer but question another’s statement or challenge someone’s contradiction of a statement.

In addition to Helen, the designated Physics teacher-leader, several others in the group had clearly formed social roles acknowledging their expertise in various areas, particularly in mastery of physical concepts. This was true of Gail, who had an advanced degree in

experimental physics, and Chet, who also taught undergraduate physics in the evenings at a nearby community college and had led his former secondary school's physics department for many years in a neighboring town before taking a post at the Gateway. Chet had won awards for teaching in his former district, albeit in teaching Advanced Placement physics to juniors and seniors, not conceptual physics to freshman. The example below, taken from a later session of the school-organized workshop (Excerpt 1), highlights an interaction among those involved in 'challenging' patterns of positioning. Roger, Chet, and Helen work out their physics expertise in interaction with one another. Ana is a teacher in her third year of teaching who plays an important role in this interaction by developing and clarifying in ways that serve to draw in others.

Excerpt 1 ⁷

School-organized Workshop, 26 May 2005 (exchange 5: 133-169)

CHET: I know that Tom Tsu's new book <comin out> [>] about physics is all energy [//] it's <pushed> all through energy [//] the whole thing. (1)

ANA: <It's> [<] # Yeah well you know in terms of um, like abstractedness... you know like waves and electricity definitely are more abstract than motion and energy. (2a) You know in terms of like starting a little bit more concrete (2b) and moving to more abstract topics? (2c)

ROGER: It's also the order the textbook does it (3a) which means you won't run into the situation where if you're asking a homework problem in chapter eighteen it'll say as you remember from chapter six. (3b) My kids will say well we haven't read chapter six. (3c)

ANA: Wait you're saying motion then what? (4)

ROGER: Well if you [////] the [//] I mean the more classic order would be # motion probably followed by energy... (5)

CHET: Um hm. (6)

ROGER: And then <heat waves electricity> [>] or electricity waves. (7)

CHET: <waves> [<] (8)

HELEN: Right. (9a) But that puts all the math [//] all the most mathematical stuff up front. (9b)

ROGER: Right. (10)

Chet refers to the forthcoming secondary school physics textbook (move 1) from a leading textbook author in Physics, a move that provides external validation for the prior point that Chet has made about the need to start the semester with energy and also shows Chet to be aligned with what is current in the field of teaching high school physics. Roger, on the other hand, looks back to traditional order as authoritative (move 3a). Helen, subsequent to this portion of the sequence, refers to her experience with the school's Physics First curriculum and her knowledge of students' versatility with math. All three are acknowledged by each other and the group as holding epistemic authority on the general topic of Physics and the teaching of Physics.

In this interaction each has a perspective that puts one person's authority about the topic at odds with another's. Note that unlike Ana's moves, all of the main moves made by the three more senior teachers are full declaratives and none involves a rising tone that might show an openness to others' opinions or a question tag at the end of the sentence that would explicitly ask for confirmation. Along with the challenge, however, are minor moves that continue to hold the interaction together and move it forward. The repetition of others' words

(Chet, move 8) and short affirmations (Roger, move 10) are ways that participants demonstrate intersubjectivity despite disagreement. These moves, combined with Ana's inquiries, serve as mortar for the metaphorical bricks that each of the senior teachers are laying down as they try to sort out a mutually agreeable stance.

5.2.2 Supporting through tracking and co-developing

In thematic terms, stating the facts or one's opinion or taking up a challenge to uphold one's authority all depend upon the traditional notion of epistemic authority as provider of authoritative information. But maintaining solidarity as well as eliciting others' contributions—both of which are crucial to generative interactions in a group—demand an apparent handing-over of one's authority in subtle ways that do not depend solely on providing information but on building shared understanding. These kinds of supportive interactions are far more common in this data set than the challenging pattern presented above.

I identified two distinct patterns of positioning that support sustained interaction, tracking and co-developing, along with a third pattern that arises in the combination of these, co-developing through tracking. The speech moves that make up the tracking position elicit the contribution of others, typically through probes that expand on others' contributions while prompting further elaboration. The following example (Excerpt 2) comes from the March 31st meeting of the teacher-organized group, during a workgroup discussion among Helen, Josie, and Louise. Helen, with Josie listening on in this part of the sequence, queried Louise about a "series and parallel circuit" lab she had just finished teaching and which Helen and Josie were going to teach the following week. They were seeking advice about setting up the lab from Louise, who had a reputation for inquiry learning.

Excerpt 2

Teacher-organized Group-B, 31 March 2005 (exchange 23: 1482-1545)

HELEN: Louise, so you used this version here? (1)

JOSIE: The shor(t) [//] the series and parallel circuits lab. (2)

LOUISE: Yeah. (3)

HELEN: And you had them [///] so did you tell them how to set th(ese) [///] so you didn't tell them how to set up the bul [//] light bulbs (4a) and what did they come up with? (4b)

LOUISE: So half of them set up things in series and half of (th)em <set up in parallel> [>]. (5)

HELEN: <(be)cause they> [<] only had two lightbulbs, right? (6)

LOUISE: Naw they had the little packages that came with it in the series and parallel kits which had like three # bulb holders and two batteries. (7a) So some of them like immediately hooked everything [!] that they had together and had to be <beaten> [>] [joke] and other ones... (7b)

JOSIE: [laugh] (8)

HELEN: (Be)cause if you gave them [//] if all you gave them was two lightbulbs # then all that they could come up with is # <a series and a parallel> [>]. (9)

LOUISE: <a series and a parallel> [<] (10a) although # some of (th)em would hook up # a series in like [//] I mean a parallel circuit that's like a figure eight with a battery in the middle (10b) and some of them would hook it up with like a figure eight with a battery at one end? (10c)

HELEN: Yes # um. (11)

LOUISE: Right exactly. (12a) So their choices are sort of limited # which is good. (12b)

HELEN: Yeah, ok. (13)

Louise is positioned as an acknowledged expert but in a manner that is quite different from the resolving pattern that closes down opportunities for expansion discussed earlier. The interaction between Louise and Helen opens up possibilities for elaboration through Helen's probes and requests for clarification. This excerpt shows both moves that elicit additional information by requesting further clarification (move 1) or by teasing out implications for ratification (moves 4b, 6). The latter can be seen in Helen's coupled statement and question in turn 4, moves a and b: "So you didn't tell them how to set up the light bulbs. And what did they come up with?" This excerpt also shows the similar role that development moves play in drawing out implications, albeit without the explicit or implicit request for ratification that signals probing moves. As an example, Helen switches from a probing move to development in move 9: "(I)f all you gave them was two lightbulbs # then all that they could come up with is a series and a parallel..." Louise's responses demonstrate how probing moves, initiated by Helen (moves 4b and 6), work with Louise's resolve moves (moves 5 and 7a) to form a simple adjacency pair; in one instance, (move 7a), a "repair" corrects misinformation.

The series of moves including questions, probes and other-development put Helen in the role of supportive interviewer and Louise in the role of willing interviewee, elaborating, clarifying and correcting. Louise is not giving direct advice about what the other teachers should do. The combination of moves was frequently used by the more experienced teachers within the teacher-organized group at various times to debrief details of others' approaches to teaching. This is a dialogic version of the monologic pattern identified by Horn (2007) as teaching "replays", in which one teacher recounts what she had done in her classroom, offering up extended anecdotes to raise questions about what went on or to address another teachers' concerns. Note that the acknowledged expert in this pattern is the teacher from whom information is being sought, not the interrogator. In this way the tracking pattern asserts tacit control through the apparent relegation of control of the substance of interaction to the interviewee; nonetheless, the interviewer maintains interpersonal control through her questioning.

5.2.3 Co-developing

The pattern of co-developing appears when several participants build on each others' contributions in closely aligned ways, with one speaker after another completing the preceding speaker's move. As Sacks et al. (1974) point out, this kind of latching is not evidence of competition for time to be heard—none of the participants express frustration or challenge the rights of others to complete their thoughts. Rather, co-development allows for a quick vetting of new ideas (Sawyer & Berson, 2004).

5.2.4 Co-developing through tracking

Co-developing combined with tracking takes interaction into new areas through a mix of other-completion of moves along with tracking moves that develop the content of the interaction. The example below (Excerpt 3) comes from the May 26th school-organized workshop. Here Helen, Chet, and Ana discussed how much prior knowledge students would need to carry out a "water wheels" lab towards the end of the course.

Excerpt 3

School-organized Workshop, 26 May 2005 (exchange 20: 1007-1051)

CHET: I think that they understand what K E [kinetic energy] and P E [potential energy] is hopefully at that point # and work (1a) and

- then you understand and you have the water reservoir (1b) and it has potential energy and can you now apply some of these things into a project (1c) and if they have to then they have to revisit it. (1d) Some of them will and some of them won't. (1e)
- HELEN: I mean I think the efficiency piece of it could be new. (Partnership for 21st Century Skills)
- CHET: which is where the heat hit kit kicks in, right? (3)
- HELEN: Right yeah. (4)
- CHET: Because everything is lost to heat # pretty much. (5)
- HELEN: And the water wheels ties in really well with the research project. (6)
- CHET: Right. (7a) We could always try it. (7b)
- HELEN: Yep. (8)
- CHET: And if we don't like it <go back to something else> [>]. (9)
- ANA: <You could also do it> [<] like in terms of like lifting: like mechanics problems that were tying forces? (10a) You know what I mean? (10b) Like energy it takes to [//] like just more force problems? (10c)
- HELEN: Um hm. (11)
- CHET: Um hm. (12)
- ANA: Like work and force # kind of connection there. (13)

This excerpt proceeds through an initial series of self-development moves (Chet, moves 1a-1e), then other-development of ideas already presented (Helen, move 2), followed by a brief probing move (move 3) and resolve (move 4) that check for mutual understanding, and then further development until Ana introduces a new idea for ratification through Ana's final probing move (move 10c). There is a step-wise progression of tracking and development, with the development moves functioning as markers of agreement that enable another speaker, Ana in this case, to enter the interaction with a probing move (move 10a) that offers yet another opportunity to expand the interaction.

6 Discussion

My presentation of findings has focused on characterizing patterns of positioning that involve those acknowledged as experts during interaction. I showed how the strongly-framed patterns of declaring, resolving and contradicting were indicative of explicit control, aligning with everyday notions of expertise and serving to limit the range of available positions for interactants as well as possibilities for further interaction. I then identified patterns of weakly-framed interaction that operate through implicit control, which serve to open up sustained interaction around a topic. Of the three patterns I identified, co-developing was the most constrained in terms of positioning, as it limited participants to close elaboration of a particular line of thinking. The other patterns hinged on acknowledgement of shared expertise among participants but in different ways. Tracking occurred with the need to elicit information or experience from others and was typically led by a dominant participant serving as interviewer. Challenging, on the other hand, entailed interaction among those with divergent views of a common domain. The final pattern discussed, co-developing through tracking, offered the greatest flexibility to the most participants in that involvement in interaction did not depend on prior acknowledgement of expertise by others, an essential aspect of the challenging pattern.

Table 2 summarizes the ways in which different values of framing along a continuum from strong (+) to weak (-) for both the ideational order as well as the social order are manifested in either supportive or confrontational patterns of positioning in interaction. The patterns of positioning are arrayed to show that weak framing increases the possibilities for sustained interaction among a wider group of interactants. Patterns of positioning that rely on explicit control through strong framing of both the social and ideational order entail deference, as I have noted. Implicit control through weak framing of either ideas or social relations requires a negotiation of difference through support or confrontation. As the table shows, the negotiation of difference can be in terms of the ideas under discussion (co-developing) or in terms of interpersonal relations (tracking) or both (co-developing through tracking, challenging).

[TABLE 2 ABOUT HERE]

In my initial presentation of framing, I noted that Hasan (2001) maintained that weak framing entailed implicit control through networks of relations involving a wide variety of strategies of control. Bernstein (1996) characterizes this as mechanisms of control that focus on the person rather than the position. Positional relations in the teacher-organized Physics First Group were seen by group members, both junior and senior, as symmetrical. However micro-analysis reveals that interpersonal relations were not symmetrical. Those who made use of the greatest range of speech moves in interaction and employed dominant patterns of positioning were those who maintained epistemic authority in areas valued by the group, such as inquiry teaching, traditional physics teaching, physics disciplinary knowledge, and the craft knowledge of having worked in the school over a long period of time. These areas are closely tied to the Physics First curriculum and the legacy of its development by the group. The weak framing of the social order within the group enacted through the kinds of patterns discussed here supported the more junior teachers in making substantive contributions within boundaries already established by the group.

The one group member central to the widest range of different patterns of positioning was Helen, the teacher-leader. Within the group, she and others portrayed her role primarily in its operative dimension as a support for the group in the teaching and continuous development of the Physics First curriculum. This view of her role was borne out to a great extent by the predominance of weak framing in intragroup interaction. She had a formal role through which she held managerial authority as teacher-leader; however it was the enactment of epistemic authority that she and a small number of others in the group maintained that shaped the possibilities for relations among ideas as well as relations among the members of the group.

7 Conclusion

This study highlights the complex interplay of interpersonal dynamics and knowledge building practices in the collaborative work of teachers and teacher leaders, even for groups who view themselves and are viewed by others as productive and effective. Close inspection of sequences of interaction revealed typical ways that group members positioned themselves in relation to one another and, simultaneously, in relation to ideas about teaching and learning Physics. The study articulated the connections between patterns of supportive and confrontational positioning and explicit and implicit modes of control, characterized in terms of strong and weak framing along the twinned dimensions of social relations and relations among ideas.

Based on these findings, I put forward an expanded view of epistemic authority in knowledge building as the negotiation of difference and show how the negotiation of difference depends on flexible social relations or thematic elaboration or both. The teacher-leader, Helen, took particular responsibility for initiating and maintaining patterns of positioning that upheld weak framing. She employed the broadest repertoire of speech functions overall and, thus, participated in the greatest range of patterns of positioning. This interpretation of epistemic authority as arising through interactional dynamics adds new dimensions to the prevailing views of authority as lodged in particular roles. That is, the view of authority as a role is a characterization rooted in strong framing of interaction, one marked by explicit control and hierarchical relations.

This research highlights the ways in which authority operates through implicit control in key moments of interaction intended to build professional knowledge through collective inquiry. Reforms that promote professional collaboration are often predicated on the assumption that procedural democracy is either a pre-condition for knowledge building or an illusion. Attention to patterns of positioning gives empirical insight into how authority is mutually and dynamically constructed. The horizon of interaction and its potential for progressive discourse depends on the constraints and affordances of particular settings. More broadly the study contributes to the sociology of everyday knowledge in education through its emphasis on understanding the operation of implicit control in the processes of collaborative work, which has become a fundamental element of reforms of schooling in the current era.

(7,683 words)

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Table 1

Participating teachers listed in descending order of years of teaching experience.

Pseudonym	Subjects	Years at L-G (June 2005)	Years Teaching	Participant in	
				TOG ^a	SOW ^b
Roger	physics	36	36	x	x
Louise	physics & biology	7	15	x	x
Helen ^d	physics	12	12	x	x
Chet	physics	1	11	x	x
Brent	physics	1	7	x	x
Ana	physics & biology	2	3	x	x
Gail	physics	2	2	x	x
Josie	physics	2	2	x	x
Beth ^g	physics	0.25	0.25	x	

^a Teacher-organized Group

^b School-organized Workshop

^d Helen was the physics teacher-leader.

^h Beth was a student-teacher supervised by Helen and taking primary responsibility for teaching one of Helen's classes until her practicum ended in late May.

Table 2
Framing Values and Associated Patterns of Positioning

	Framing		Patterns of Positioning	
	Social relations	Ideational relations	Support	Confront
Sustained Interaction →	+	+	Declaring, Resolving	Contradicting
	+	-	Co-developing	
	-	+	Tracking	
	-	-	Co-developing through tracking	Challenging

8 Endnotes

¹ Pseudonyms are used for institutional and individual names.

² “Administrators’ Information Packet,” internal communication, 13 September 2004.

³ “Rationale for TfU for L-G,” internal communication, 28 April 2004.

⁴ Among the disciplinary areas, science teaching has a relatively long tradition in both differentiated staffing and teacher collaborative work, due to federal funding and curricular reforms in the United States that emphasized the value of teacher inquiry for promoting student inquiry (Rudolph, 2002).

⁵ In characterizing sequences, I drew on the work of Horn (2002) who uses the term “episodes of pedagogical reasoning” to define a unit of analysis in her study of collegial interaction in teacher teams. She does so in the service of explaining ways teachers represent and engage with examples of classroom experience in their collegial interaction (see p. 12). In functional terms, her study puts primary emphasis on ideational meanings.

⁶ To check the reliability of coding, I asked two colleagues to code 12 exchanges amounting to 20% of the overall turns in each of six sequences. I found an average of 78% agreement when comparing my coding with each of the two others across all 12 exchanges, varying from a high of 94% to a low of 67%. Over several rounds of discussions and coding, I revised the codebook and re-coded all sequences.

⁷ The following basic transcription conventions are used in the excerpts:

#	pause between words
##	long pause between words
xxx	unintelligible speech, not treated as a word
xx	unintelligible speech, treated as a word
[?]	unintelligible, preceding word is best guess
[!]	stress
[text]	transcriber comment or local event (e.g., laugh, groan, etc.)
[//]	self-correction
[///]	restart
text(text)text	partial or non-completed word
...	trailing off
<text> [>]	overlapped speech
<text> [<]	overlapping speech
(number)	a turn made up of a single move, e.g., (3), appearing at end of turn
(number letter)	a turn made up of more than one move, e.g., (3a), appearing at end of each move